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OUTLINES
OF THE
FIFTEENTH CHAPTER
OF THE
PROPOSED GENERAL REPORT
ON THE SUBJECT
of
MANURES.



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OF THE
FIFTEENTH CHAPTER
OF THE
PROPOSED GENERAL REPORT
FROM THE
BOARD OF AGRICULTURE.

ON THE SUBJECT OF
MANURES.

LONDON:

PRINTED FOR THE CONSIDERATION OF THE BOARD,
BY W. BULMER AND CO.

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OUTLINE
OF THE
NINETEENTH CENTURY
OF THE
PROGRESS OF
THE
BOARD OF AGRICULTURE

ON THE SUBJECT OF
MANURES



PRINTED FOR THE COMMISSIONERS OF THE BOARD

BY W. BARNES AND CO.

1870.



ADVERTISEMENT.

THE following Sketch or Outline, will explain the nature of the General Report, which it is proposed shall be laid by the Board of Agriculture, before His Majesty, and both Houses of Parliament, for the purpose of pointing out, the present Agricultural State of the Country, and the Means of its Improvement. It is intended that the Report itself, shall be drawn up in a concise and plain manner, but at the same time with as much distinctness and perspicuity as possible, so as to be adapted to the capacity of every individual, who may wish to be made acquainted with the subject. The Appendix will contain those minuter facts and more detailed observations, which are necessary for the consideration of those, who make the cultivation of the soil, or the breeding of animals, a profession. The object of the whole is, to give such an abstract of the agricultural knowledge, either accumulated by the Board since its establishment, or previously known, as will make Skill in Husbandry, easily attainable, and at little expence, by the poorest of our husbandmen, or by the meanest capacity.

It is hardly necessary to add, that the following is merely the sketch of the Chapter, which is printed at present, for the purpose of procuring such corrections and additional remarks, as

may occur on the perusal. It is proposed to circulate this, and the other Chapters of the Report, as soon as they are respectively printed, among the Members of the Board, who will please to communicate it to such of their friends as are conversant in those subjects; and return it to the Board early in the course of the ensuing winter, with every suggestion that can tend to its improvement.

Whoever takes the trouble of perusing the following sketch, and considers for a moment the effect of having such a paper examined, corrected, and enlarged by the observations of at least one hundred intelligent persons, conversant in those subjects, must see that the knowledge of the use and application of Measures is likely to be brought to a degree of perfection, which would not otherwise have been attainable.





OUTLINES OF CHAPTER FIFTEEN,

ON

MANURES.

PRELIMINARY OBSERVATIONS.

FOR ADDITIONAL REMARKS
AND OBSERVATIONS.

THE term Manure, is applied to all substances, that are known from experience, either to enrich the different soils, or, by stimulating their natural powers, to render them more favourable to vegetation. But though little doubt can be entertained in regard to the utility and necessity of such substances, the progress hitherto made, in ascertaining the manner in which they operate, has been very inconsiderable; and it still remains a question, whether the food of plants is derived from the Manures employed, or the combinations which they form with the principles contained in the earth; or whether their chief benefit depends, upon calling forth the latent virtues of the soil; or extracting useful substances from the atmosphere.

The most superficial observation will serve to convince every intelligent person, that in an Agricultural point of view, the subject of Manures is of the first magnitude. To correct what is hurtful to vegetation in the different soils, and to restore what is lost by exhausting crops, are operations in Agriculture, which may be compared to the curing of diseases in the animal body, or supplying the waste occasioned by labour, or the ordinary evacuations of nature.

The utility of Manuring has, however, been questioned in

some instances, particularly in the system laid down by *Tull* and his disciples, who assert that Tillage alone, judiciously applied, will produce every effect that can be expected from that practice. That Tillage, properly conducted, is essential to the success of agricultural operations, is a point in which all good husbandmen are agreed; but that by tillage alone, the earth should be made to produce a succession of valuable crops, is a doctrine, which, fortunately for the advancement of Agriculture, has met with very few converts.

Another opinion has been held forth to the public, in a very intelligent Agricultural Survey laid before the Board,* that when land has once been put into good heart, it may be preserved in a state of constant fertility, merely by a proper rotation of crops. If the advocates for such a system mean, that when land has been put into good heart, it will be kept in a state of fertility by a proper rotation of crops, and the assistance of its own manure only, we are of opinion, that in some situations this may actually be the case. But if, as in *Tull's* system, it is meant that the earth shall continue to pour forth an endless succession of valuable crops, by means of judicious rotations alone, without any Manure being made use of, it is only necessary to observe that we might as well suppose, that any animal after having made a full meal, should continue to live, and perform every kind of labour, without any further supply of food. The contrary certainly is the case, both with regard to animals and vegetables; for if the nourishment is less than the waste, the animal will die, and the soil become barren.

But it is unnecessary to extend our observations on this subject farther, for a good farmer will, to a certain extent, adopt the tillage of *Tull*, for the purpose of pulverizing the soil and extirpating the weeds with which it may be infested; a regular rotation of crops, in order that the various sorts of earth, may, in their turn, according as they are calculated for different plants, become productive, and joined to both, a sufficient quantity of Manure,

* See Maxwell's Huntingdonshire, p. 29, &c.



that the soil may not only not be exhausted, but if possible that some addition may be made to its former sources of fertility.

For the purpose of bringing a subject of such acknowledged importance as Agriculture, to a still higher degree of perfection than it at present possesses, a thorough investigation of every branch of it is necessary. It is, however, to be regretted, that the foundation of the whole, namely, the principles upon which fertility and vegetation depend, are still but imperfectly known. Even the little knowledge of these matters which we are at present in possession of, has hitherto been confined to the closets of the learned, and seldom been deemed a necessary part of education, for those, whose prospects and success in life, depend so materially upon judicious and scientific husbandry.

In the article of Manures in particular, a knowledge of the principles of vegetation would be peculiarly useful; for, by it the intelligent farmer would be enabled to examine and ascertain the distinguishing properties of the substances he makes use of; to collect, prepare, and employ them to the greatest possible advantage; and to accommodate them to the soil for which they are respectively the best adapted; and thus by having it in his power to combine the cause and the effect, he has the means of calculating, with much more certainty than he could otherwise do, upon the success of all his operations.

Having premised these general observations, we shall now proceed to take notice of the predominant qualities of all the substances employed at present as Manures, explain the great or leading distinctions between the different classes, and then add some remarks on the different modes of using them.

DIVISION OF MANURES.

Manures may be divided into two classes; viz. *Enriching* and *Stimulating*. Some authors treat of them as connected with the *animal, vegetable, or mineral kingdoms*. This division may be

more philosophic than the former, but we apprehend, the one we have chosen is better calculated for real use. Where Manures are supposed to partake both of enriching and stimulating qualities, they will be respectively put under that class with which they seem principally connected.

The enriching or feeding Manures include animal bodies, fat oily vegetable matters, and, in general, all those substances that are insoluble in water without the addition of some active principle.

The stimulating Manures comprehend lime, alkaline salts, and all calcareous, absorbent, or alkaline earths.

These two classes, amounting in number to 44, comprehend the whole of the simple Manures. The compounds formed between any two or more of them, constitute a third class, to be treated of under the general name of Composts.

A fourth class of Manures, for we find it impossible to give it any other name, is that which is formed by a mixture of soils, or the application of one soil to another, with a view of rendering the whole more productive.

Much of the success of all agricultural operations will depend upon understanding these distinctions properly; as without a perfect knowledge of all Manures, and the soils upon which they ought properly to be laid, the application of the one to the other, must always be a matter of much chance and uncertainty.

I. OF ENRICHING OR FEEDING MANURES.

The advantages resulting from the application of enriching Manures were probably the first discovered: indeed it is not possible that they could long be concealed.* The eye of observation

* It is certain, however, that, at a period so late as the commencement of the present century, the inhabitants of the islands with which North Britain

would soon perceive that the spots upon which the dung of cattle was either dropped, or accidentally laid, were much more productive than the rest of the field.

But the fact once ascertained, the intelligent husbandman would not fail to profit by the information, and not only to employ these substances which experience had found valuable, but eagerly to search for others that would produce the same effect.

The following list comprehends the substances belonging to this class of Manures.

LIST OF FEEDING OR ENRICHING MANURES.

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| 1. Dung of animals. | 13. River weed. |
| 2. Pigeons' dung. | 14. Mud from ponds, rivers, or the sea. |
| 3. Poultry dung. | 15. Sweepings of streets and roads. |
| 4. Urine. | 16. Earthen or mud walls from folds. |
| 5. Privy manure. | 17. Burnt clay. |
| 6. Bones. | 18. Malt dust. |
| 7. Blood, and putrid animal substances. | 19. Tanner's bark. |
| 8. Refuse of manufactories, as woollen rags, hair, horn shavings, scrapings of oiled leather, shoemakers' chips, slam from alum works, saw dust, &c. | 20. Soot. |
| 9. Oil cakes. | 21. Peat moss and peat dust. |
| 10. Oil. | 22. Sheep folding. |
| 11. Fish. | 23. Ploughing in of green crops. |
| 12. Sea weed. | 24. Decayed vegetable substances. |
| | 25. Watering. |
| | 26. Putrid water from the steeping of flax or hemp. |

An account of the nature, properties, and mode of applying each of these, will be found in the Appendix.

is surrounded, were accustomed to throw the dung of their cattle into the sea, in place of spreading it upon the land. The Manure collected at Limerick was thrown into the Shannon not many years ago. Formerly also, persons were paid for sweeping the streets of London and Edinburgh, which has since become a source of income to both these cities. The parish of Marybone paid, a few years ago, 500*l.* per annum to, and now receives 1050*l.* from, its scavenger. Herts, p. 39.

II. OF STIMULATING MANURES.

The effect of calcareous substances upon vegetation is, perhaps, one of the most valuable and extraordinary discoveries that Agriculture has to boast of. It is hardly possible for the wildest imagination to conceive a proposition apparently more absurd, than that of taking a piece of the hardest stone or marble, burning it till completely calcined, throwing cold water upon it, with a view of reducing it to a white powder, and expecting from the effect of that powder, when mixed with the soil, a luxuriant crop of grain, of grass, or other vegetable production; and yet, when properly applied, the effect is unquestionable.

The use of lime, and other stimulants, cannot be traced to any very remote antiquity; and in all probability was owing to chance. Lime dropt by accident, or laid down for other purposes, might produce such effects as to attract attention, and thus lead to the use of it as a manure.

Even of late years its beneficial effects were discovered in one part of this kingdom, by the accidental circumstance of the rubbish of an old building being spread about.* Such a discovery once made, every attention would naturally be paid to select similar substances; and the ingenuity of the husbandman would be directed to the means of rendering them useful.

The following is a list of the substances comprehended under the name of Stimulating Manures.

* The lime rubbish of an old building having been spread on the corner of a field, first discovered the effect of this powerful manure, and suggested the mode of application now generally adopted. Carse of Gowrie Report, p. 12.

LIST OF STIMULATING MANURES.

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|----------------------------------|--|
| 1. Burnt limestone. | 10. Soap ashes. |
| 2. Unburnt or pounded limestone. | 11. Soap ley. |
| 3. Chalk. | 12. Fern ashes. |
| 4. Limestone gravel. | 13. Peat ashes. |
| 5. Marle. | 14. Wood ashes. |
| 6. Sea shells and coral. | 15. Turf ditto, from paring and burning. |
| 7. Pot ash. | 16. Sea salt. |
| 8. Kelp. | 17. Gypsum, or Paris Plaster. |
| 9. Bleachers' ashes. | 18. Charcoal. |

This class, in general, along with the properties which they possess of acting upon the soil and increasing its fertility, when applied by themselves, have likewise the power of destroying oily annual seeds; such as mustard, &c. and even slugs and other vermin.

III. OF COMPOSTS.

This class comprehends all those artificial mixtures, that are formed by any two or more of the other Manures, often with the addition of earth.

Every farmer of experience knows that certain compounds, formed between the different kinds of Manures and soils, have a much greater effect in promoting vegetation, than any of these taken separately. But though this circumstance is familiar to most of them, they have hitherto made little progress in ascertaining the manner in which composts operate, or the principles upon which their operation depends.

In analyzing the different soils and manures, we learn, that some of them contain more oil than they do alkali or calcareous earth, and *vice versa*. From this disproportion of principles, such soils and manures are less productive than they would otherwise be, if their useful qualities were more equally balanced. By compounding or mixing the two together, that end is attained.

Some farmers object to composts on account of the expence, and affirm that every addition of soil, or other substances, made to a dunghill serves only to increase its bulk, and the expence, without adding any thing to its real value; and that the dung itself is a much better manure, upon all soils, than it can possibly be made by any addition.

That the dung of animals is a most valuable article is beyond all doubt, but there is reason to believe that it possesses too much oil and too little alkaline salt, to be equally useful in all soils and situations. For that reason, it is much better calculated for what are called active, than for inactive soils. On limestone, chalk, &c. &c. it meets with abundance of active materials, which compensate for the want of them in itself. But upon *clays, deep loams, &c. &c.* it operates best in conjunction with lime, or some other stimulating substance.*

* When dung is intended for a compost, no attempt should be made to add lime or earth, till it is properly fermented; as every addition of that kind will be found to check fermentation, and diminish the value of the compound. The lime and earth should be added, after the fermentation is finished, and the whole carefully mixed and laid up together. A few days after this is done, a second fermentation will come on, and, if the mixture has been properly turned over and thoroughly incorporated, in a month or six weeks afterwards it will be fit for use.

Considerable judgment and attention will, however, be requisite, with regard to the quantity of lime, and other active principles employed; for if the quantity is small, their action upon the oils, and rich animal substances contained in the dung, will be partial and imperfect; and if too great, a considerable loss may be sustained by their over action. The proportion

When earth is added to such a compost care should be taken to regulate the quantity in such a manner, as to prevent it from pressing the dunghill too hard; for, in every instance where this happens, the air will be excluded, so much as to prevent a second fermentation from coming on; and the compost in that case will neither incorporate so well, nor be so valuable.

IV. OF A MIXTURE OF SOILS.

Next to the application of enriching and stimulating Manures, the fertility of the earth depends upon the predominant qualities of the soil; every different kind of which being made up of the same principles, but differently proportioned. In cases where there is a deficiency of any of these, the fault may be rectified by the application of another soil, containing the ingredients that are wanted. Thus, where clay predominates, the addition of sand, particularly if it contains decayed shells, is often sufficient to insure fertility, and, where sand prevails, the addition of clay or chalk answers the same purpose. Gravelly soil enriches moss, and moss improves gravel. Indeed, until the soil acquire a due proportion of the various ingredients that are necessary to insure fertility, the husbandman is particularly called upon to search every where, in the neighbourhood of his fields, for such substances as are likely to accomplish this desirable purpose.*

that will bring their active and passive qualities nearest to a balance, or, in plainer language, the quantity that will dissolve the oils and fat substances contained in the dung, will certainly be found the most useful.

* The celebrated chemist, Kirwan, very justly remarks, that one of the great desiderata in husbandry, seems to be this, namely, to discover the composition of the different earths best suited to detain or exhale the due

We wish this circumstance be particularly attended to, as there is abundant reason to believe, that every field has in its neighbourhood some substance, which if properly applied, would give it fresh powers of production. To discover this, not only the surface, but the different sub-soils should be carefully examined, and it is more than probable that some useful article will be found, which if mixed either with the dung of the farm, or applied by itself, will render the soil more favourable to vegetation.

This mixture of soils answers many very important purposes in agriculture. Stiff soils, which water can hardly penetrate, are by a proper mixture of light earth, sand, or other incoherent substances, opened and subdivided, so as to admit freely a quantity of moisture and other nutritive matters, sufficient for the nourishment of plants.*

Light soils again, by being incorporated with clay, are thereby rendered more retentive of moisture: by this mixture also the roots of vegetables are at full liberty to spread themselves in all directions, not only in search of their natural food, but also to acquire an establishment in the soil, sufficient to support the trunk and branches of the plant. For it is found, that no vege-

proportion of the average quantity of moisture that falls in each particular country. See Irish Philosophical Transactions, vol. v. p. 197.

* The following is a striking instance of the benefit resulting from a mixture of soils. Mr. Elkington had on his farm of Princethorpe, some fields of strong clay, which he could not plough in a wet season, nor could wheat be always sown in it at the proper time. He was sometimes obliged to employ 6 horses to plough it, and 7 men to level it, by cutting the heaps with 3-pronged forks, as spades could not be made use of on account of their sticking. But by carrying a great quantity of sandy soil, (120 loads per acre), and adding afterwards one coat of marl, the quality of the land became so changed, that 4 horses can plough it, that no men are necessary for levelling it, and that in the wettest season wheat can be sown. The expense of digging and carriage, may be calculated at 28 s. per 30 load, which is equalled about 1 s. per 100 load. Suppose that the marl cost 1 l. per acre, the whole cannot be called a great expense, for so durable and permanent an improvement, which adds to the staple value of the soil, instead of being a mere temporary advantage.

